

TABLE I

property measured	value observed
Viscosity @ 1 radian/sec	220,600 poise
5 Cure Exotherm Peak Temperature	121.3°C
Linear Coefficient of Thermal Expansion from 50°C to 150°C	154 ppm/°C
10 Tensile Strength at Break	1310 psi
Elongation at Break	25.3 percent
Modulus @ 25% elongation	30.5 psi
Specific Gravity	1.52
Durometer	91.5 Shore A
15 Dielectric Constant 100 Hz	2.9
Dielectric Constant 100 kHz	2.9
Dissipation Factor 100 Hz	0.0004
20 Dissipation Factor 100 kHz	<0.0002
Volume Resistivity	1.4×10^{15} ohm-cm
Dielectric Strength	507 V/mil

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TABLE II

TEST	TEST DESCRIPTION	QUANTITY TESTED	RESULTS	
5	Preconditioning	24 hour 125°C bake, 168 hrs. 85°C/85% RH soak ⁴ , 3x reflow at 220°C (EIA/JEDEC Standard JESD22-A113-B ⁶)	38	0 failures
10	Temperature Cycle on FR-Board ¹	-40°C to 125°C ⁵ , cycle to 50% failure	30	0 failures ² /250 cycles 0 failures ² /500 cycles 0 failures ² /750 cycles 0 failures ² /1000 cycles 0 failures ² /1250 cycles 0 failures ² /1500 cycles
15	Temperature Cycle Package Only	-55°C to 125°C ³	8	0 failures ² /250 cycles 0 failures ² /500 cycles 0 failures ² /750 cycles 0 failures ² /1000 cycles
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¹Package solder balls reflowed attaching the package to an epoxy fiberglass (FR-4) board simulating actual usage.

²Failure is defined as an open or short when voltage is applied.

³MIL-STD-883 1010.7 Temperature Cycling Test Method Test Condition B.

⁴10 minute soak times are used at each temperature extreme with testing of each electrical I/O for shorts at indicated times.

⁵MIL-STD-883(modified test condition per specification)

⁶Joint Electron Devices Engineering Council

PROCESS STEPS TABLE

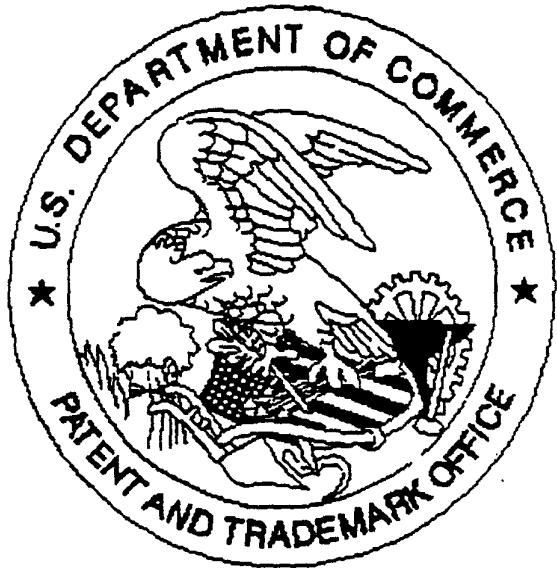
(a comparison of the prior art methods to the methods
of the inventive process disclosed and claimed herein)

TYPE OF PROCESS					
Step	Print Spacers/		A*	B**	
	No.	Print Die	Dispense Die	As Dots	As Pad
		Attach	Attach	Use Pad Adhesive	
5	1	Print Spacers	Print Spacers	Remove liner	Print Spacers
	2	Cure Spacers	Cure Spacers	Punch or Place Adhesive	Attach hot die
10	3	Print die attach	Dispense die attach	Apply pressure and/or heat	Attach Hot die
	4	Attach hot die	Attach hot die	Remove liner	
15	5			Attach hot die	
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* A is a composition of this invention wherein dots are used as the spacer material.

** B is a composition of this invention wherein pads are used as the spacer material.

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